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**B60R 21/16**

(52) UK CL (Edition L)

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(56) Documents cited

**GB 2239433 A**

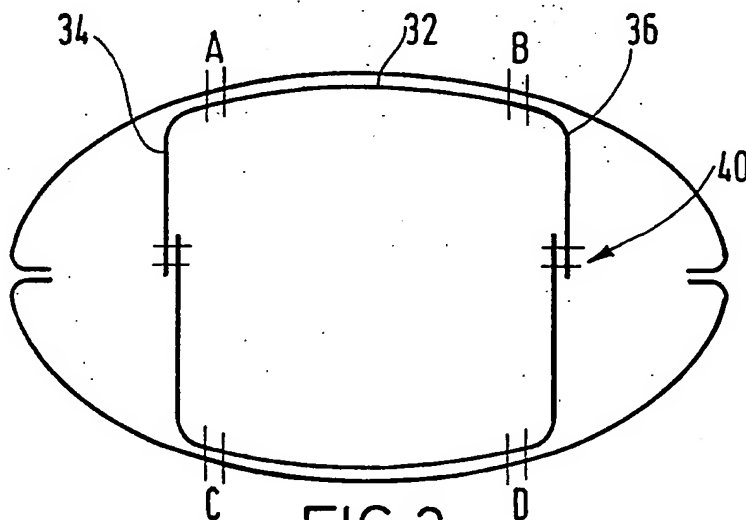
(58) Field of search

**UK CL (Edition K) B7B BSB**

**INT CL<sup>5</sup> B60R**

(54) **Limiting strap assembly for a vehicle air bag**

(57) A strap assembly for use with an inflatable airbag of the type having front and back pieces comprises two strap sub-assemblies, each strap sub-assembly comprising an attachment portion 32 for attachment to one of said front and back airbag pieces, and a number of straps 34, 36 extending from said attachment portion, the free ends of the straps having joint portions 40 for joining to the joint portions of the respective straps of the other sub-assembly.



**FIG.3.**

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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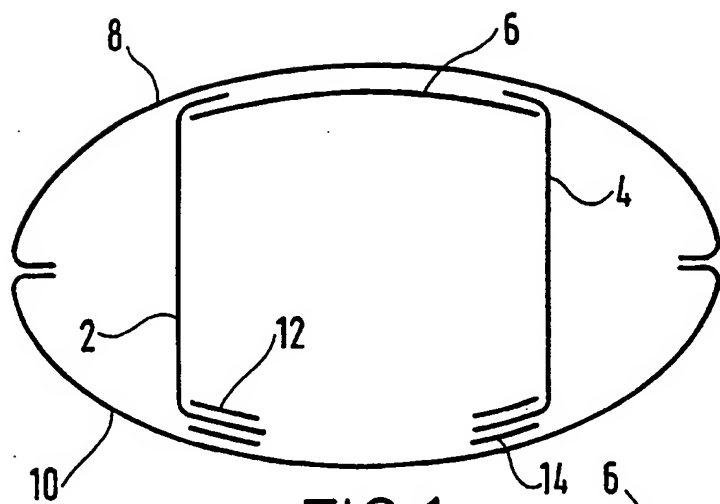


FIG. 1.

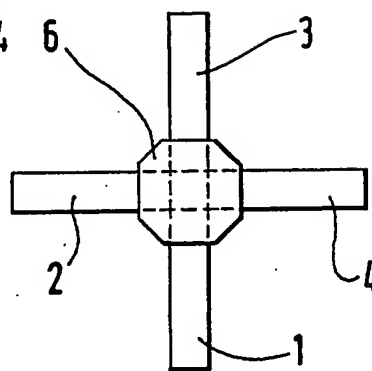


FIG. 1A.

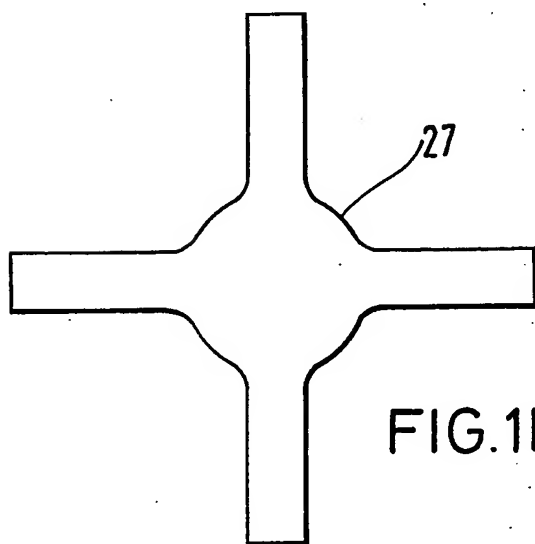
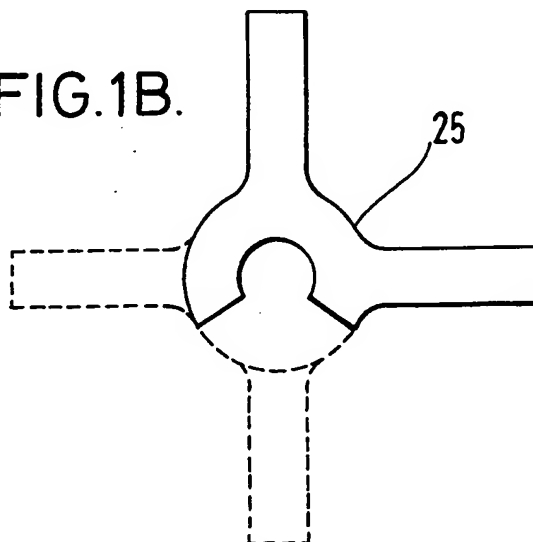


FIG. 1B.



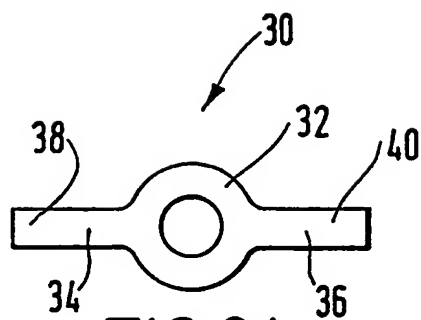


FIG. 2A.

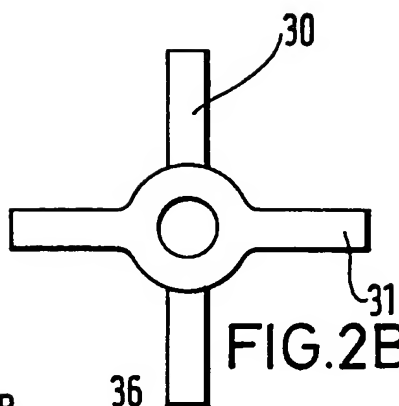


FIG. 2B.

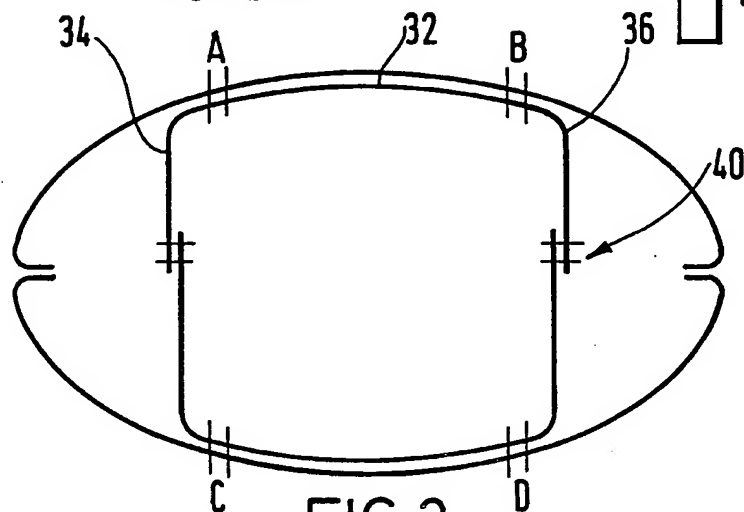


FIG. 3.

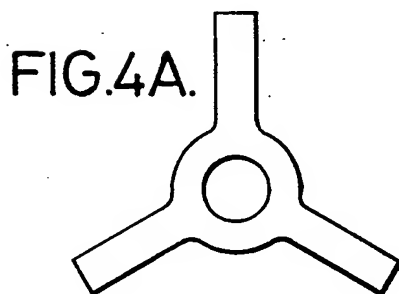


FIG. 4A.

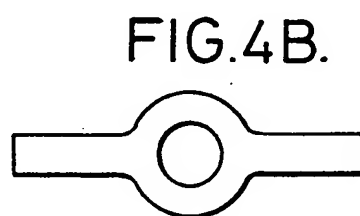


FIG. 4B.

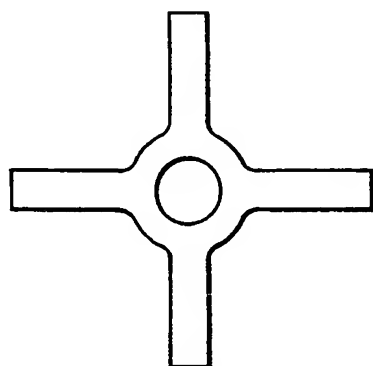


FIG. 4C.

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**LIMITING STRAP ASSEMBLY**

The present invention relates to a new type of limiting strap assembly, and to a method of attaching same to an airbag. Whilst the kind of airbag with which the present invention is concerned comprises front and back pieces joined together in the desired shape, it is equally applicable to other kinds of airbag, for example a woven one-piece airbag such as that described in the applicant's PCT Patent specification No WO 90/09295.

These airbags are commonly utilised as protection devices in vehicles, and are arranged to be inflated rapidly in the event of a collision, to protect the vehicle's occupants. The inflation is generally brought about by means of a gas generator attached to the bag, which is activated automatically at the instant of collision.

It is standard practice to incorporate into the bag a number of internal straps which are attached between the front and back pieces of the bag, and act as limiting straps to limit and control the degree of inflation of the bag.

Conventionally, a typical limiting strap assembly comprises two or more strip-like pieces sewn to a reinforcement patch which is itself attached to the front piece of the airbag, before the two pieces of the airbag are sewn together. The free ends of these straps are then interposed between two layers of fabric and are sewn in at the opposite side (back piece) of the bag, these layers having been pre-sewn to the bag in a previous operation.

Another conventional kind of strap assembly comprises a pre-cut cross or "L" shape of fabric. A reinforcement patch may be used to attach the straps (at the corner of the "L" or the centre of the cross) to the front piece, or they may be attached directly, and the free ends are sewn in at the back of

the bag, interposing the ends between two layers of fabric, known as "attachment discs", in the same manner as previously described.

In both of these kinds of conventional strap assemblies, the strap material may be coated or uncoated fabric. Where coated, it may have a coating, typically of chlorobutadiene rubber (Neoprene), on one or both sides. It may also be a woven webbing with or without coating.

Both of these strap assemblies suffer from the disadvantage that different components are required for the front and back pieces of the airbag, and the sewing operations are often numerous.

The purpose of the present invention is to provide an improved type of strap assembly which requires few components and is more efficiently attached to the bag pieces.

According to the present invention there is provided a strap assembly for use with an inflatable airbag of the type having front and back pieces, the strap assembly comprising two strap sub-assemblies, each strap sub-assembly comprising an attachment portion for attachment to one of said front and back airbag pieces, and a number of straps extending from said attachment portion, the free ends of the straps having joint portions for joining to the joint portions of the respective straps of the other sub-assembly.

Each strap sub-assembly comprises one or more strap pieces which can vary in shape, and may comprise a single strap piece or two strap pieces superimposed to give the desired number and arrangement of straps.

Conveniently, the central portion comprises a ring shape which acts as a strengthening and attaching piece, with two or more straps extending outwardly from the ring and spaced equally.

around the perimeter of the ring.

Preferably, the strap pieces are cut of single side coated fabric.

This new design of strap assembly requires substantially the same shape of components on both sides of the airbag, and this results in less wastage of material and reduced sewing operations. Also, the inclusion of strengthening pieces in the cut component means that the additional reinforcement patches and attachment discs of the conventional strap assemblies are not required. Whilst the two strap sub-assemblies are preferably similar in shape, it is found that in practice it is more convenient to have the straps of one sub-assembly slightly longer than the straps of the other sub-assembly.

The present invention also provides a method of constructing an airbag having front and back pieces and an internal strap assembly, the method including attaching a strap sub-assembly to each of the front and back pieces of the airbag, said strap sub-assembly comprising an attachment portion for attachment to the front and back pieces of the airbag and a number of straps extending therefrom, the free ends of the straps having joint portions for joining to the joint portions of the respective straps of the other sub-assembly, and joining the joint portions of the straps of one sub-assembly to the joint portions of the respective straps of the other sub-assembly.

The present invention also provides an airbag of the type comprising front and back pieces and an internal strap assembly consisting of two strap sub-assemblies, each strap sub-assembly being attached to one of said front or back airbag pieces via an attachment portion on the sub-assembly, and each sub-assembly also being attached to the other sub-assembly, by means of joint portions located on the free ends of a number of straps extending from the attachment portion of each sub-

assembly.

The embodiments of the present invention will now be described by way of example only, and contrasted with the prior art, with reference to the accompanying drawings in which:-

Figure 1 shows one type of conventional strap assembly and method of attaching it to an airbag.

Figure 1A shows detail of the conventional strap sub-assembly as shown in Figure 1.

Figure 1B shows different conventional strap types.

Figure 2A shows a strap piece forming part of the sub-assembly of the present invention.

Figure 2B shows how two of the pieces shown in Figure 2 are superimposed to form a sub-assembly.

Figure 3 illustrates the attachment of the two sub-assemblies to the airbag.

Figure 4 (A-C) illustrate various different shapes of strap pieces made out of single cut pieces of fabric.

Referring to the drawings, Figure 1 illustrates how the straps of conventional strap assembly are attached to the airbag. First, the ends of the strap pieces 1,2,3,4 are sewn to a reinforcement patch 6 which is then itself attached to one side 8 of the bag. The free ends of straps 1,2,3,4 are then each interposed and sewn in between two circular attachment pieces 12, 14 which have themselves been previously sewn to the other side 10 of the airbag.

In Figure 1A this conventional arrangement of straps is shown in more detail, and comprises two separate pre-cut pieces of

fabric which form a cross. A piece of reinforcing fabric 6 is sewn to the junction of straps 1,2,3,4 and the assembly is then attached to the airbag in the same manner as is shown in Figure 1. Figure 1B illustrates different conventional strap types where a single piece of fabric in "L" (25) or cross shape (27) is cut. The length of each strap is designed to attach between attachment discs at the bag attachment interface as in the previously described conventional method.

Figure 2A illustrates an embodiment of the present invention, in which there is provided a unitary strap piece 30 having a central attachment portion 32 for attachment to the airbag pieces, and two straps 34, 36 outstanding from the central portion 32. The free ends 38 and 40 of these two straps form joint portions which will be joined to similar joint portions on another strap piece. In Figure 2B, two strap pieces 30 and 31 are superimposed at 90° to each other to provide a four strap sub-assembly.

For the four strap sub-assembly, two strap pieces as shown in Figure 2A are cut out of single side coated fabric, and two of these pieces are arranged perpendicular to each other and sewn directly into the front or back pieces of the airbag with, for example, circular patterns which, when sliced through as in Figure 3 show the sewing lines A,B,C and D.

After the bag front and back pieces are joined in a conventional manner, the four free ends of the straps of the two sub-assemblies are joined together using conventional sewing patterns and machines. This is preferably a symmetrical arrangement with substantially the same components and the same sewing operations on both sides of the airbag.

Figure 4 illustrates possible strap shapes, such as the three strap arrangement shown in Figure 4A, the two strap arrangement shown in Figure 4B, or the four strap arrangement shown in Figure 4C. It should be appreciated that the number and



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arrangement of straps could be varied, and two or more strap shapes could be superimposed in the manner shown in Figure 2B.

CLAIMS

1. A strap assembly for use with an inflatable airbag of the type having front and back pieces, the strap assembly comprising two strap sub-assemblies, each strap sub-assembly comprising an attachment portion for attachment to one of said front and back airbag pieces, and a number of straps extending from said attachment portion, the free ends of the straps having joint portions for joining to the joint portions of the respective straps of the other sub-assembly.

2. A strap assembly according to Claim 1, wherein each strap sub-assembly comprises a single strap piece or two strap pieces superimposed to give the desired number and arrangement of straps.

3. A strap assembly according to Claim 1 or Claim 2, wherein the central portion comprises a ring shape which acts as a strengthening and attaching piece, with two or more straps extending outwardly from the ring and spaced equally around the perimeter of the ring.

4. A strap assembly according to any of the preceding claims, wherein the strap pieces are cut of single side coated fabric.

5. A method of constructing an airbag having front and back pieces and an internal strap assembly, the method including attaching a strap sub-assembly to each of the front and back pieces of the airbag, said strap sub-assembly comprising an attachment portion for attachment to the front and back pieces of the airbag and a number of straps extending therefrom, the free ends of the straps having joint portions for joining to the joint portions of the respective straps of the other sub-assembly, and joining the joint portions of the straps of one sub-assembly to the joint portions of the respective straps of the other sub-assembly.

6. An airbag of the type comprising front and back pieces and an internal strap assembly consisting of two strap sub-assemblies, each strap sub-assembly being attached to one of said front or back airbag pieces via an attachment portion on the sub-assembly, and each sub-assembly also being joined to the other sub-assembly, by means of joint portions located on the free ends of a number of straps extending from the attachment portion of each sub-assembly.

7. A strap assembly substantially as herein described and illustrated in Figures 2A through 4C of the accompanying drawings.

8. A method of constructing an airbag substantially as herein described and illustrated in Figures 2A through 4C of the accompanying drawings.

9. An airbag substantially as herein described and illustrated in Figures 2A through 4C of the accompanying drawings.

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**Patents Act 1977**  
**Examiner's report to the Comptroller under**  
**Section 17 (The Search Report)**

**Application number**

GB 9223753.6

**Relevant Technical fields**

(i) UK Cl (Edition K ) B7B (BSB)

(ii) Int Cl (Edition 5 ) B60R

**Databases (see over)**

(i) UK Patent Office

(ii)

**Search Examiner**

PAT EVERETT

**Date of Search**

10 DECEMBER 1992

**Documents considered relevant following a search in respect of claims** 1-8

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
A	GB 2239433A (TAKATA)	

SF2(p)

MS - doc99\F11000234

Category	Identity of document and relevant passages	Relevant to claim(s)

#### Categories of documents

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